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L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON INSECTS AFFECTING VEGETABLE AND TRUCK CROPS.

THE STRIPED BEET CATERPILLAR.

BY

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PAPERS ON INSECTS AFFECTING VEGETABLE AND TRUCK CROPS.

THE STRIPED BEET CATERPILLAR.

(*Mamestra trifolii* Rott.)

By H. O. MARSH,
Entomological Assistant.

INTRODUCTION.

Among the caterpillars or "worms" which infest sugar beets in the Arkansas Valley in Colorado and Kansas is the so-called garden Mamestra or clover cutworm (*Mamestra trifolii* Rott.). This insect is ordinarily one of the minor beet pests, although during some years it develops in sufficient numbers to cause noticeable damage. The writer had this insect under observation in the Arkansas Valley during portions of four years (1909–1912), and this article is based on notes made during those years.

In the Arkansas Valley the larvæ were found on two plants only—sugar beet and lamb's-quarters (*Chenopodium album*). Sugar beet appeared to be the favorite.

EXTENT OF INJURY.

Except in the year 1911 the larvæ were rare and caused practically no damage throughout the years the species was under observation. During 1911 hundreds of beet fields were examined in the territory between Pueblo, Colo., and Garden City, Kans., and almost without exception the larvæ were found on beets in all of these fields. The larvæ were most abundant and generally distributed during the middle and latter half of June. During this month about 75 acres of small beets in various portions of the valley were observed to be stripped of foliage. About 5 acres were destroyed. As a rule the defoliated beets promptly recovered and put out new leaves, but occasionally the larvæ destroyed the crowns of the plants, and when this damage occurred the plants died.

During July, August, and early September the larvæ were moderately common on beets, but the infested areas were scattered and practically no damage resulted. Late in the fall they developed in considerable numbers on beets in some fields. At this season, however, the infested beets were mature, and no noticeable damage resulted. The majority of these larvæ reached maturity during October, and many pupæ were observed during the latter part of the month and in early November. The winter of 1911–12 was exceptionally severe, and the extreme cold apparently killed the pupæ. No live individuals were found during the following spring, and the larvæ were very rare throughout the summer of 1912.

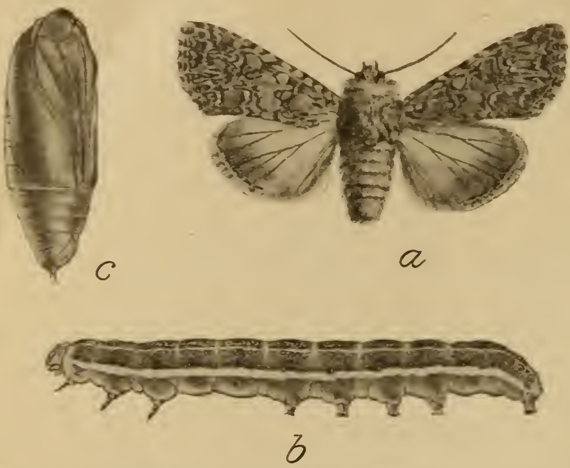


FIG. 4.—The striped beet caterpillar (*Mamestra trifolii*): *a*, Moth; *b*, caterpillar; *c*, pupa. Enlarged. (Original.)

GENERAL APPEARANCE AND HABITS.

The adult of the striped beet caterpillar is a stockily built moth belonging to the lepidopterous family Noctuidæ. (See fig. 4, *a*.) The forewings are dull grayish brown and have an expanse of about $1\frac{5}{16}$ inches. The hind wings are grayish, with brown markings. The moths are attracted to lights but are sluggish and, except for occasional individuals which may be found resting on boards, telegraph poles, and in similar locations, are seldom seen by the casual observer.

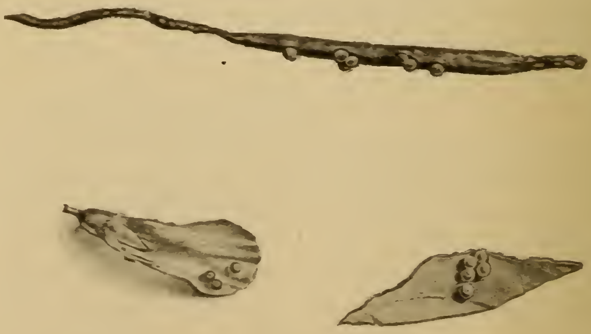


FIG. 5.—The striped beet caterpillar: Eggs. (Original.)

The eggs (fig. 5) are rather large, pearly white or pale yellow, ribbed, and hemispherical. They are deposited singly on the underside of the leaves.

The mature larvæ (fig. 4, *b*) are about $1\frac{1}{4}$ inches in length and are dull green, with a more or less distinct pinkish stripe along each side. The larvæ are voracious feeders. When infesting sugar beets they prefer the older leaves, and the infested foliage may be entirely consumed, with the exception of the petioles. The full-grown larvæ burrow into the soil to the depth of about an inch and form pupation cells in the earth by wriggling about.

The pupæ (fig. 4, *c*) are "chunky," reddish brown, and about nine-sixteenths of an inch in length.

LIFE HISTORY.

There are three generations of this insect in the Arkansas Valley each year. The first moths are to be found during the latter half of May. These deposit eggs, from which a generation develops during the first part of July. Eggs deposited by the July generation produce moths during the latter part of August and in early September. The larvæ of the third generation mature late in the fall, and the pupæ which develop live through the winter in cells in the soil. Adults develop from these pupæ during the latter half of May of the following year.

REARING RECORDS.

During 1911 and 1912 the following rearing records were obtained in the laboratory at Rocky Ford, Colo.

On June 1, 1911, a few eggs were collected in the field from sugar beets. They were deposited singly on the underside of the leaves. The record is as follows:

June 1	Eggs collected.
June 5	Eggs hatched.
June 19	Larvæ reached maturity.
June 21	First pupæ formed.
July 2	First adults issued.

From the foregoing records the stages are as follows:

	Days.
Egg stage	4
Larval stage	16
Pupal stage	11
Total	31

On June 7, 1911, two apparently mature larvæ were collected in the field from sugar beets. They burrowed into the soil and formed their pupation cells June 9 and pupated June 11. The adults issued June 29. In this case the pupal period was 18 days.

September 17, 1911, a female moth captured at Rocky Ford was placed in a cage containing sugar-beet foliage, alfalfa blossoms, and dilute honey. She fed eagerly on the honey sirup, and on September 19, 123 eggs were deposited. The record is as follows:

September 19	First eggs deposited.
September 24	Eggs hatched.
November 4	First larvæ reached maturity.
November 10	First pupæ formed.
May 16, 1912	First adults issued.

From the foregoing records the stages are as follows:

	Days.
Egg stage	5
Larval stage	47
Pupal stage	187
Total	239

The moths which issued May 16 were placed in a cage and fed with dilute honey. The first eggs were deposited May 20. The record is as follows:

First generation.

May 16	Moths issued.
May 20	First eggs deposited.
May 25	Eggs hatched.
June 12	First larvæ reached maturity.
June 16	First pupæ formed.
July 5	First adults issued.

From the foregoing records the stages are as follows:

	Days.
Egg stage	5
Larval stage	22
Pupal stage	19
Total	46

The moths which issued July 5 were placed in a separate cage and the first eggs were deposited July 11. The record follows:

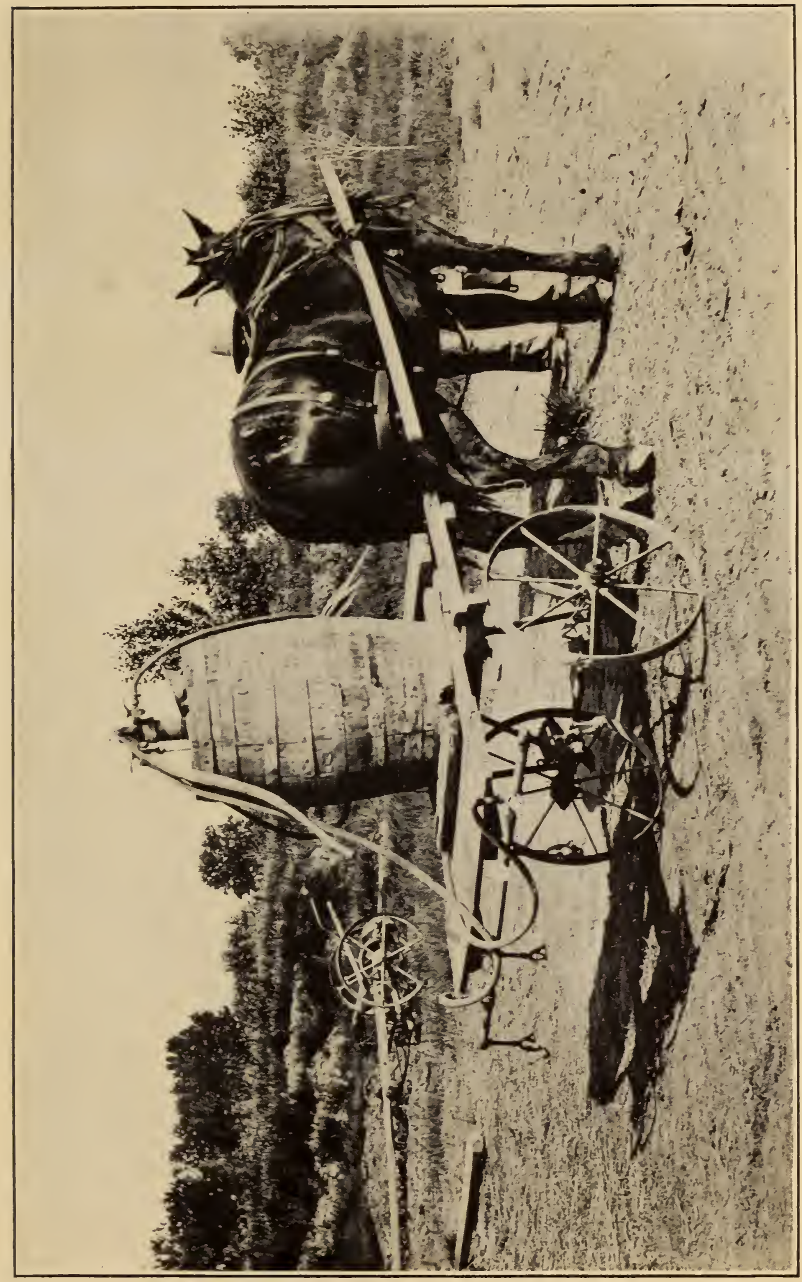
Second generation.

July 5	Moths issued.
July 11	First eggs deposited.
July 17	Eggs hatched.
August 2	Larvæ reached maturity.
August 5	First pupæ formed.
August 20	First adults issued.

From the foregoing records the stages are as follows:

	Days.
Egg stage	6
Larval stage	19
Pupal stage	15
Total	40

PLATE V.



FIELD SPRAYER SUITABLE FOR SPRAYING SUGAR BEETS. (ORIGINAL.)

Only nine moths of the second generation developed in the cages and, unfortunately, all were females. They deposited hundreds of eggs which were infertile, failing to hatch. Judging from the records which were obtained the previous fall it may be concluded that there are three full generations each year.

EGG-LAYING RECORD.

On September 17, 1911, a female moth was captured and placed in a cage. Eggs were deposited as follows:

	Eggs deposited.
September 19	123
September 20	114
September 21	82
September 22	78
September 23	82
September 24	25
Total	504

The moth died September 25.

NATURAL ENEMIES AND OTHER CHECKS.

As previously noted, the pupæ are formed in earthen cells, near the surface of the soil, in the beet fields. When the beets are cultivated or plowed out at harvest time, many of the cells are broken open and the pupæ crushed or exposed to the weather. This is an efficient check.

During the winter of 1911–12 the minimum temperatures at Rocky Ford ranged from —15° to —26° F. This exceptionally cold weather apparently killed many pupæ.

In addition to these factors in control, there are several species of parasitic and predaceous insects which serve to check the increase of the Mamestra larvæ. The following records were obtained at Rocky Ford:

Microdus inedius Cress., a braconid, was reared July 9, 1912. It is a medium-sized red and black insect with dusky wings.

Meteorus sp. (Chttn. No. 597), a smaller braconid, honey yellow in color, was reared July 11.

A still smaller species, a braconid (Chttn. No. 598), was reared August 1, but not positively identified. The body is black, the antennæ and legs are yellow, and the abdomen is marked with yellow. The larvæ of this parasite feed externally, in a cluster, on the dorsal surface of the Mamestra larvæ.

Phorocera claripennis Macq., a tachinid, was reared August 4. This fly is a common cutworm parasite.

Perilloides bioculata Fab., a pentatomid, was frequently found stabbing the partly grown Mamestra larvæ.

Phidippus coloradensis Thorell, a spider, was found rarely, feeding on the smaller larvæ.

RECOMMENDATIONS FOR CONTROL.

During 1911 the writer conducted several spraying experiments against the larvæ with Paris green, arsenate of lead, and arsenite of zinc. It was found that the larvæ of all sizes were readily killed with arsenicals. In fact this is one of the most easily controlled pests which occur on sugar beets in the Arkansas Valley.

Paris green proved more quickly effective than other poisons tested, and the following formula is recommended:

Paris green	pounds	3
Whale-oil soap	do	6
Water	gallons	100

This mixture should be applied to sugar beets with a field sprayer (Plate V) at the rate of from 75 to 100 gallons to the acre. It is necessary to wet only the surface of the leaves with spray.

CONCLUSION.

In the Arkansas Valley the striped beet caterpillar is a minor enemy of sugar beets. Ordinarily it is held in check by cultural methods and natural enemies. Occasionally, however, it develops in injurious numbers, and when this occurs the larvæ can be easily controlled by spraying with Paris green.

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